

THE AUSTRALIAN NAUCORIDAE (INSECTA, HEMIPTERA-HETEROPTERA) WITH DESCRIPTION OF A NEW SPECIES

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Summary

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The Naucoridae of Australia are redescribed and keys to genera and species are provided. A new species, *Naucoris subaureus* sp. nov. is described from Western Australia. Lectotypes are designated for *Naucoris australicus* Stål and *N. subopacus* Montandon. Distributional and ecological notes are given for all six species.

KEY WORDS: Naucoridae, *Naucoris*, *Aphelocheirus*, distribution.

Introduction

The described Australian naucorid fauna of five species (*Naucoris australicus* Stål (1876), *N. congrex* Stål (1876) and *Aphelocheirus australicus* Usinger (1936) from Queensland, *N. subopacus* Montandon (1913) and *N. rhizomatus* Polhemus (1984) from the Northern Territory) is relatively depauperate compared with that of New Guinea. La Rivers (1971) lists 20 endemic species in eight endemic genera, from that area.

Naucoris Fabricius is an 'Old World' genus with ca. nine species recorded from the Oriental Region. It has not been recorded from New Guinea or New Zealand.

The inclusion of *Aphelocheirus* Westwood in the Naucoridae is debatable. China & Miller (1959) and Popov (1970) included the genus in the Naucoridae subfamily Aphelocheirinae. However, Poisson (1957) considered the genus merited family status and its omission by La Rivers (1971) from his world checklist of Naucoridae implies acceptance of this contention. A recent review by Hoberlandt & Štys (1979), retained *Aphelocheirus* in a subfamily of the Naucoridae.

Polhemus (1984) briefly reviewed the Naucorinae of Australia. In this paper, I redefine the Australian species of the Naucoridae, including *A. australicus*, and describe a new species of *Naucoris* from Western Australia.

All measurements given are in mm.

Key to Australian genera of Naucoridae

- Vertex evenly rounded between the eyes (Figs 1, 7 & 8).
Fore femur incrassate (Fig. 55). Rostrum short, not reaching the fore coxae. Antennae short, three-segmented and not visible from above
..... *Naucoris* Fabricius 1775
Vertex produced between the eyes (Fig. 62). Fore femur not incrassate (Figs 63 & 64). Rostrum long, reaching

the mid-coxae. Antennae long, four-segmented, often visible from above - *Aphelocheirus* Westwood 1833

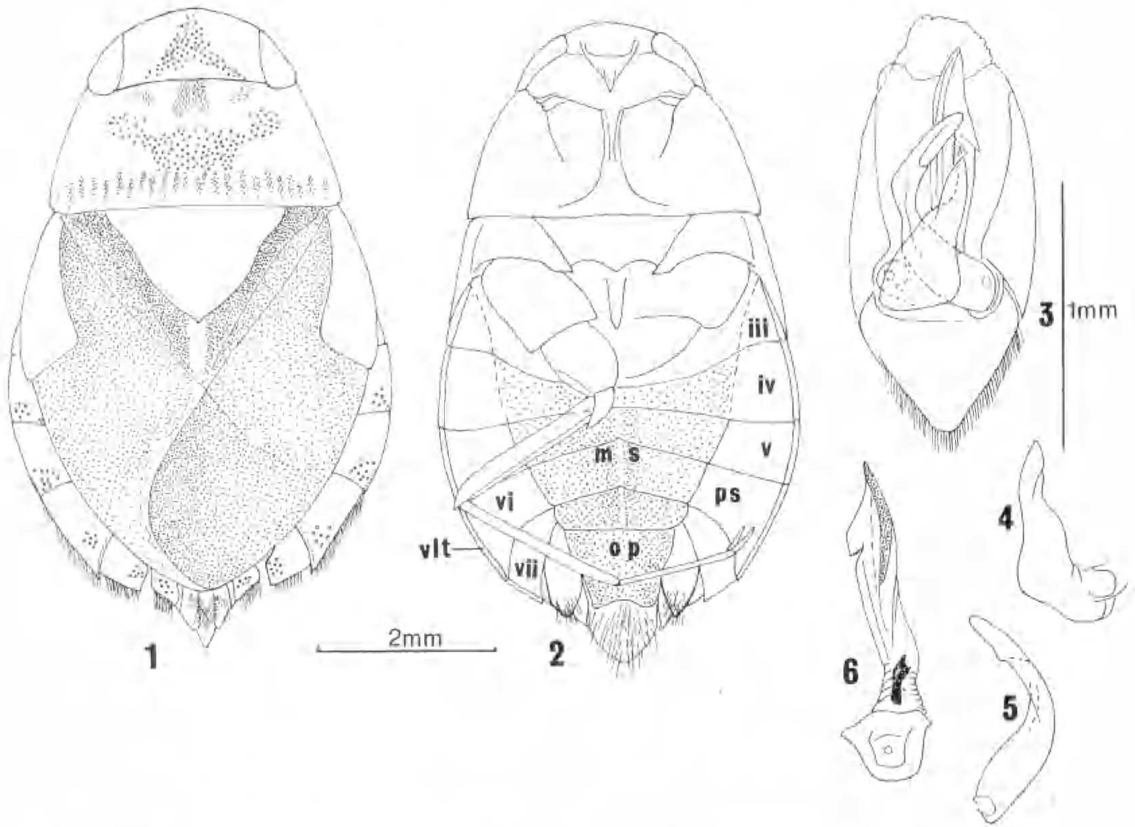
Naucoris Fabricius

Body variably flattened dorso-ventrally. Fore femur broadly triangular and incrassate, fore tibia folding into a shallow sulcus along femoral margin. Mid and hind legs "cursorial". Antennae three-segmented lying beneath eyes on underside of head. Rostrum three-segmented, two segments visible, not reaching fore coxae. Fore legs separated by a prominent pilose ridge produced cephalad. Between mid and hind coxae, small plate-like keel, not readily visible when viewed from side. Head and pronotum variously punctate light and dark brown; anterior margin of pronotum more or less straight. Clavus and corium unicolorous or bicolored; membrane not always clearly differentiated from corium and emboliar fracture not always entire. Underside of abdomen variably pubescent. Ventral latero-tergites shining, width variable, always becoming obsolete at apical margin of third sternite, posteriorly reaching seventh sternite. Sternites divided by fold or suture either side of mid-line (Fig. 2). Male genital capsule "boat-shaped", laterally heavily sclerotised, apically membranous. Parameres asymmetrical. Male fifth sternite medianly asymmetrical. Female operculum slightly rounded and distally emarginate. Within Australia, *Naucoris* is of a fairly uniform appearance.

Key to the Australian species of *Naucoris*

- 1 Posterior margin of pronotum not produced caudad at humeral angles (Figs 1, 7, & 8). Venter either appearing bare or with fine short hairs ... 2
Posterior margin of pronotum produced caudad at humeral angles (Fig. 41). All abdominal ventrites clothed in fine golden pubescence ...
..... *N. subaureus* sp. nov.
2 (1) Scutellum and most of embolium pale yellow (Fig. 1) *N. australicus* Stål
Scutellum unicolorous dark reddish brown or black, embolium basally variably pale yellow to

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Figs 1-6. *Naucoris australicus* Stål; 1, dorsum and 2, venter of Lectotype ♀. 3, genital capsule and 4, 5, left and right parameres; 6, aedeagus of ♂, Eidsvold, Qld; ms, median sternite; op, operculum; ps, parasternites; vlt, ventral latero-tergites; iii-vii sternites.

- yellowish brown, apically always dark brown to black (Fig. 7) 3
3. (2) Posterior angles of connexiva 4-6 sharply produced (Fig. 10). Shining area of 3rd ventral latero-tergite basally broader than anterior width of 4th and broadly infuscated (Fig. 39) *N. rhizomatus* Polhemus
- Posterior angles of connexiva 4-6 not sharply produced (Fig. 9). Shining area of 3rd ventral latero-tergite not basally broader than anterior width of 4th and not broadly infuscated (Figs 35-38) 4
4. (3) Dorsum of head and pronotum rugulose and rather dull. Shining area of ventral latero-tergites narrow (Figs 9 & 38) *N. subopacus* Montandon
- Dorsum of head and pronotum smooth and usually shining. Shining area of ventral latero-tergites broad (Figs 35-37) .. *N. congrex* Stål

Naucoris australicus Stål
FIGS 1-6, 26, 32-34, 51

Naucoris australicus Stål, 1876, p. 145; Lundblad, 1933, p. 62; La Rivers, 1971, p. 71; Polhemus, 1984, pp. 157-158.

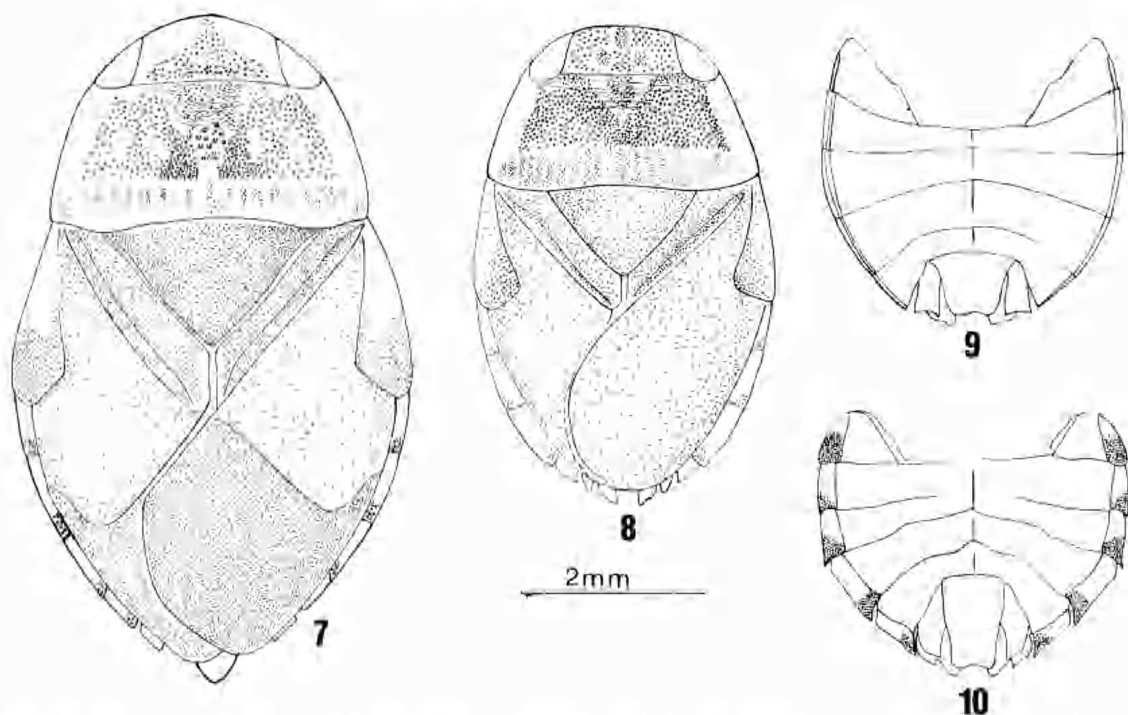
Lectotype: Female, Austral boreal, Thorey; 1 ♂ and

1 ♀ paralectotypes Australia Orient med. Thorey in the Riksmuseum, Stockholm, vid.

Distribution: Queensland.

Male 8.0-9.6 long, width 5.3-5.7. Female (lectotype) 9.5 long, width 5.7.

Colour: Head, pronotum, scutellum and most of embolium pale yellow. Head shining with a triangular group of shallow brown punctures. Pronotum shining, medianly faintly and irregularly transversely striated; anterior margin dark brown, groups of brown punctures converging from inner margin of eye towards the median line posteriorly. Between these groups of punctures, third group of larger darker punctures; posterior margin slightly darker with short irregular rows of shallow contiguous brown punctures. Clavus, corium, apical region of embolium and membrane brown with obsolete narrow, yellowish-brown stripes extending from between the embolium and claval suture almost to membrane. Connexiva pale yellowish brown, distal angles faintly infuscated with irregular prominent brown spots. Underside and legs pale yellow.



Figs 7-10. *Naucoris* spp.; 7, *N. congregata* Stal ♀ dorsum, Moggill Farm, Qld; 8 *N. subopacus* Montandon ♀ dorsum, Fogg Dam, N.T.; 9, *N. subopacus* Montandon ♀ abdomen, Adelaide River, N.T.; 10, *N. rhizomatus* Polhemus ♀ abdomen, Adelaide River, N.T.

Structure: Anterior interocular space almost the same as posterior. Pronotal humeral width $2.3-2.4 \times$ median length, the latter between $1.4-1.8 \times$ head length. Pronotal lateral margins slightly convex. Scutellum between $1.5-1.8 \times$ broader than long, lateral margins sinuate. Labrum $1.5-1.7 \times$ broader than long. Mesosternum conspicuous, slightly produced cephalad. Postero-lateral angles of the fourth and fifth connexiva forming an approximate 90° angle, sixth and seventh slightly produced, the sixth more prominent in the female (Fig. 1). Depression of seventh parasternite conspicuous, almost reaching outer margin of sternite. Male fifth sternite (Fig. 26). Shining lateral margin of third ventral latero-tergite narrow (Figs 32-34). Female seventh sternite about $2/3$ median length of sixth (Fig. 2). Operculum (Fig. 51) about $1.3 \times$ broader than long. Male genitalia (Figs 3-6).

Material examined: Lectotype female, Austral boreal, Thorey (Stockholm). One ♂, Queensland, Eisvold; one ♂ 'Queensland' (British Museum, Natural History).

Polhemus (1984) gives data for a single male from Qld, 14 miles NW of Ayr, 20 m, 14.xi.1962, E. S. Ross, E. Q. Cavagnaro. This specimen in the I. T. Polhemus collection.

Stal's 1876 account of *Naucoris* is confusing where it refers to Australian species. He

distinguished *N. australicus* from *N. congregata* because the former had a pale scutellum ("scutello pallido"). In the original description he refers to a male. The type series received from Stockholm has a female labelled TYPUS, the other two specimens have dark brown scutella and are referable to *N. congregata*. The female labelled TYPUS is hereby designated Lectotype and is labelled as such as it is the only specimen which agrees with Stal's description. The remaining male and female labelled "Australia Orient and Thorey" are hereby designated paralectotypes of *N. australicus* although they are in fact *N. congregata*.

The slender data available suggest that *N. australicus* is confined to Qld.

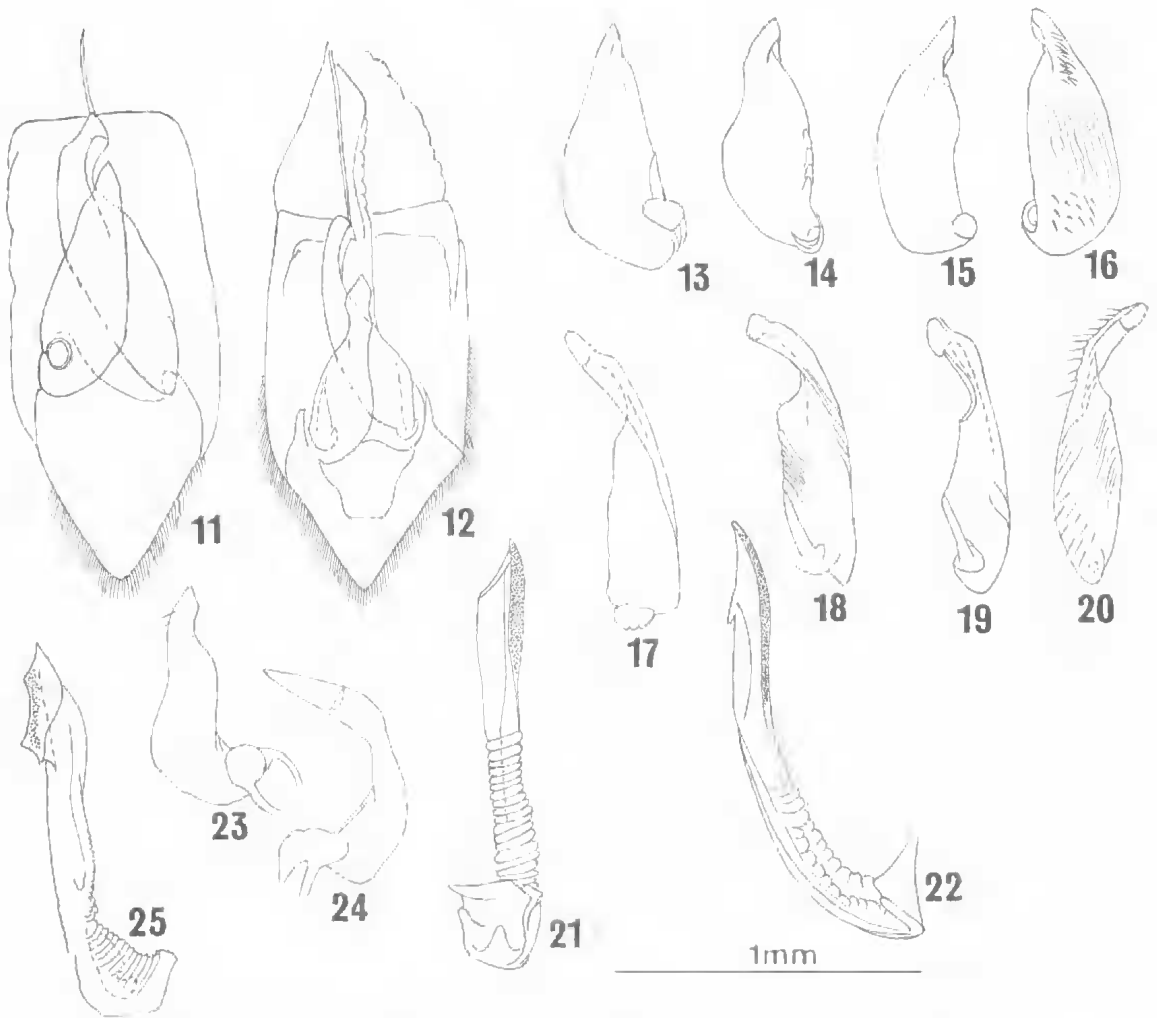
Naucoris australicus is similar in general appearance to *N. congregata*. It is easily distinguished by the pale yellow scutellum and embolium. Across the widest part of the body it has three prominent pale spots, shared by no other Australian naucorid.

Woodward *et al.* (1970) Fig. 26, 72c, figured *N. australicus*, not *N. congregata* as stated.

Naucoris congregata Stal

FIGS 7, 11-25, 27-28, 35-37 & 50

Naucoris congregata Stal, 1876, p. 145; Lundblad, 1933, p. 62; La Rivers, 1971, p. 71; Polhemus, 1984, pp. 157-159. **Holotype:** Female, Moreton Bay in the Riksmuseum, Stockholm, vid.



Figs 11-25. *Naucoris congrex* Stal male genitalia; 11, 13, 16, 17, 20 & 21, Tasmania, Tomahawk River; 12, 14, 18 & 22, Victoria, Yea River; 15, 19, South Australia, Piccaninie Blue ponds; 23-25, "*australicus*" part of type series - *congrex*; (11-12) genital capsules; 13-16 & 23, left paramere, 16, different aspect; 17-20 & 24, right parameres, 20, different aspect; 21, 22 & 25, aedeagus.

Distribution: Tas., Vic., S. Aust., N.S.W. and Qld.

Males 7.7-8.7 long, width 4.8-5.3. Females 8.5-9 long, width 5.4-6.

Colour: Occurs in two forms as follows. Dark form, head and pronotum yellowish-brown and shining. Head with a broad band of brown punctures tapering or converging towards anterior margin. Pronotum anteriorly, irregularly, transversely striate with shallow brown punctures; centre of disc with scattered larger punctures; posterior 1/3 finely striate with short rows of punctures coalescing into brown lines; lateral margins smooth. Scutellum varying reddish-brown and black; inner lateral margins of clavus pale. Embolium basally pale yellow, apically verging towards corial colour. Membrane dark brown to black with many greyish

punctures. Connexiva pale yellow, slightly infuscated posteriorly with dark brown punctures. Pro- meso and metasternum mostly black; lateral margins or mesosternal ridge yellow. Ventrites black with silvery hairs. Ventral parasternites dark brown with crescentic pale yellow indentations across ventrites. Legs pale yellow.

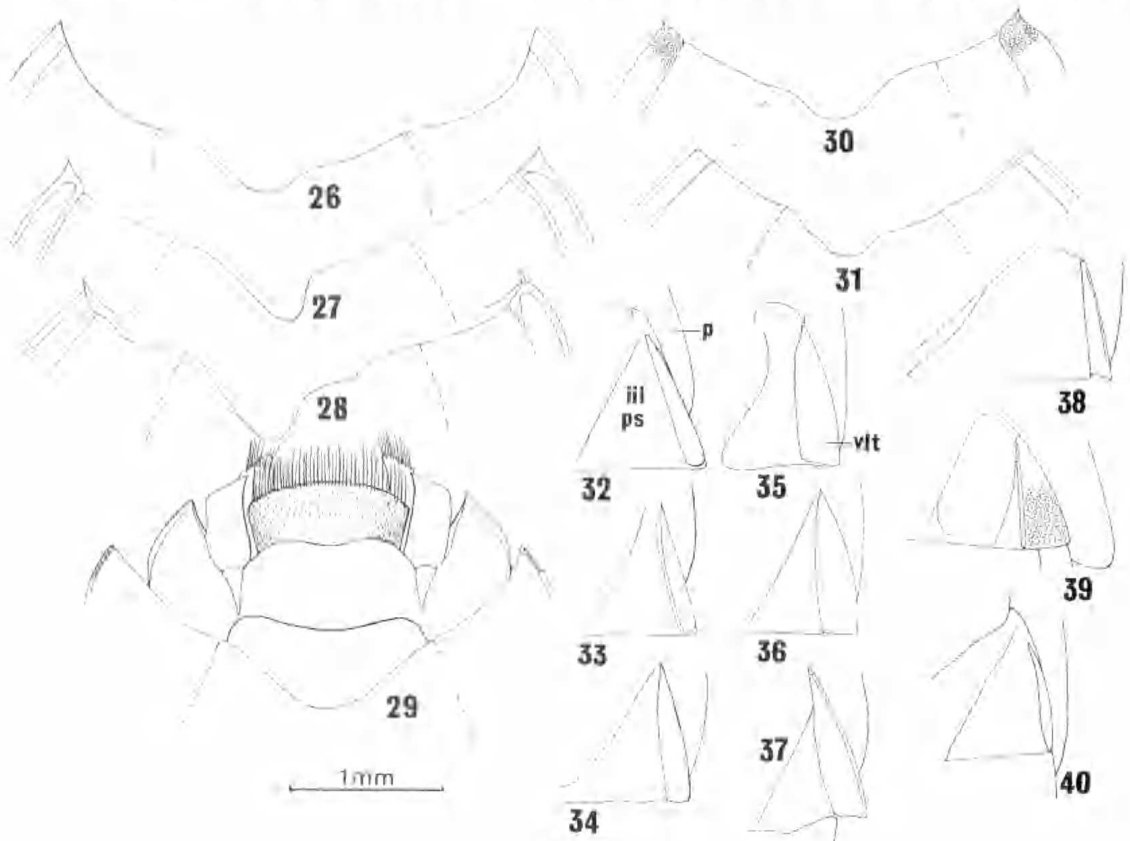
Pale form: Head and pronotum pale yellow background, brown punctures on head reduced in density and coverage, wholly confined to basal half of head. Pronotal pattern reduced; brown stripes on posterior 1/3 almost obsolete. Clavus and corium brown, membrane black. Scutellum as in dark form. Prosternum straw-coloured; coxal plates slightly pigmented. Sternites dark yellowish-brown. **Structure:** Anterior interocular space slightly

narrower than posterior space; inner lateral margin of eyes almost straight. Head width to length ratio: males 3.1-4.1× greater than length, average 3.4×. Females 2.4-4×, average 3.5×. Pronotal humeral width 2.2-2.5× median length, average 2.4; latter about twice median length. Pronotal lateral margins evenly curved. Scutellum between 1.5-1.7× broader than long, lateral margins slightly sinuate. Labrum between 1.3-1.8× broader than long, average 1.5×. Mesosternum similar to *N. australicus*. Postero-lateral angles of connexiva forming 90° angles; sixth connexiva slightly produced in female (Fig. 7). Depression of seventh parasternite large reaching inner margin of ventral latéro-tergite. Male fifth sternite (Figs 27 & 28), little variation between Tas. and Qld forms. Shining lateral margin of third latero-tergite broad (Figs 35-37). Female fifth and sixth sternites same length, seventh sternite 2/3 length sixth sternite. Operculum basally irregularly emarginate (Fig. 50). Male genitalia (Figs 11-25),

Slight variation between Tas. and mainland forms.

Material examined: Holotype female, Moreton Bay (Queensland) Riksmuseum, Stockholm. Tas.: Georgetown, G. E. Cole; Launceston; Wedge Bay, C. H. Hardy, South Australian Museum. Pawleena Lagoon, Coal River; Pond at Karanja; Blackmans Lagoon; Tomahawk River; Cape Portland Lagoon; Ikena Lagoon; Moriarty; Newnham; St Bernard's Creek; Flinders Island, Lagoon at Emita; lagoon near Robinson's Farm; North East coastal lagoon; King Island, Lake Flanagan; the preceding via Dr P. S. Lake, and now in the Australian National Insect Collection (ANIC) Canberra.

Vic.: Yallock Creek near Melbourne; farm Dam, Hammano road near Neerim (some adults teneral also immatures); farm dam near Bunyip River, Labertouche North (immature); Lake Purumbete; *Eleocharis* swamp about 8 km from Colac; farm dam about 2 km from Barwon Downs (immature); billabongs along margins of Barwon River at Inverleigh; "Sheepwash" lagoon between Cathkin and west of Molesworth, Yea Rd; backwater of Yea River at Yea (25-29.iii.1979, I. Lansbury) (ANIC, Canberra); Noble Park, 6.iv.1918, F. E. Wilson (SAM). S. Aust.: Adelaide, H. M. Hale; River Torrens, Murray Bridge, H.M.H.; Bridgewater, H.M.H.; Lucindale, A. M.



Figs 26-40. *Naucoris* spp. male 5th sternite of 26, *N. australicus* Stål, Qld; 27, *N. congrex* Stål, Tomahawk River, Tas.; 28, *N. congrex* Stål, Moggill Farm, Qld; 29, *N. subaureus* sp. nov. Millstream, Qld; 30, *N. rhizomatus* Polhemus, Coomalie Creek, N.T.; 31, *N. subopacus* Montandon, Fogg Dam, N.T. 3rd ventral laterotergite of 32, *N. australicus* Stål, Lectotype female; 33, *N. australicus* Stål, male, Eidsvold, Qld; 34, *N. australicus* Stål, male, Qld; 35-37, *Naucoris congrex* Stål; 35, Holotype female; 36, male, Tomahawk River, Tas.; 37, male, Moggill Farm, Qld; 38, *N. subopacus* Montandon, male, Fogg Dam, N.T.; 39, *N. rhizomatus* Polhemus female, Adelaide River, N.T.; 40, *N. subaureus* sp. nov. Holotype male, Millstream, Qld. Terminology p protonum; iii ps 3rd parasternite.

Lea; Roonka Sta., Blanchetown, in shallow water along edge of Cumbunga Creek, 12.v.1973, R. Inns (SAM), Mt Gambier region, Piccaninie Blue ponds near Glenelg River, 20.iv.1979, J. Lansbury; "Ewens" ponds near Mt Gambier, 21.iv.1979, J.L.; Naracoorte region, Haek's Swamp near Bool Lagoon, 23.iv.1979, J.L.; same data, Bool Lagoon, 23.iv.1979, J.L.; Kangaroo Island, river just beyond Karratta on road to Kingscote, 9.iv.1979, J.L. (ANIC, Canberra).

Qld: Cunnamulla, H. Hardcastle (SAM); Atherton Tableland, 5 km from Mareeba on Molloy-Mareeba road, 22.iv.1979, J.L.; Brisbane, Moggill Farm dam, 6.iv.1979 (some immature) J.L. (ANIC, Canberra).

A male from Tasmania, Tomahawk River, 2.xi.1972, B. Knott has a pair of tunnel-like structures made with detritus and what seem to be short naucorid hairs lying along the 2nd/3rd episternal suture where the middle coxae articulate within the thoracic cavity. These structures are almost certainly phoretic in origin; no remains of any organism were found.

The broad shining lateral margin of the third ventral latero-tergite in both sexes and the conspicuously asymmetrical fifth sternite of the male are diagnostic.

Naucoris subopacus Montandon

FIGS 8, 9, 31, 38, 53, 7, 56-61

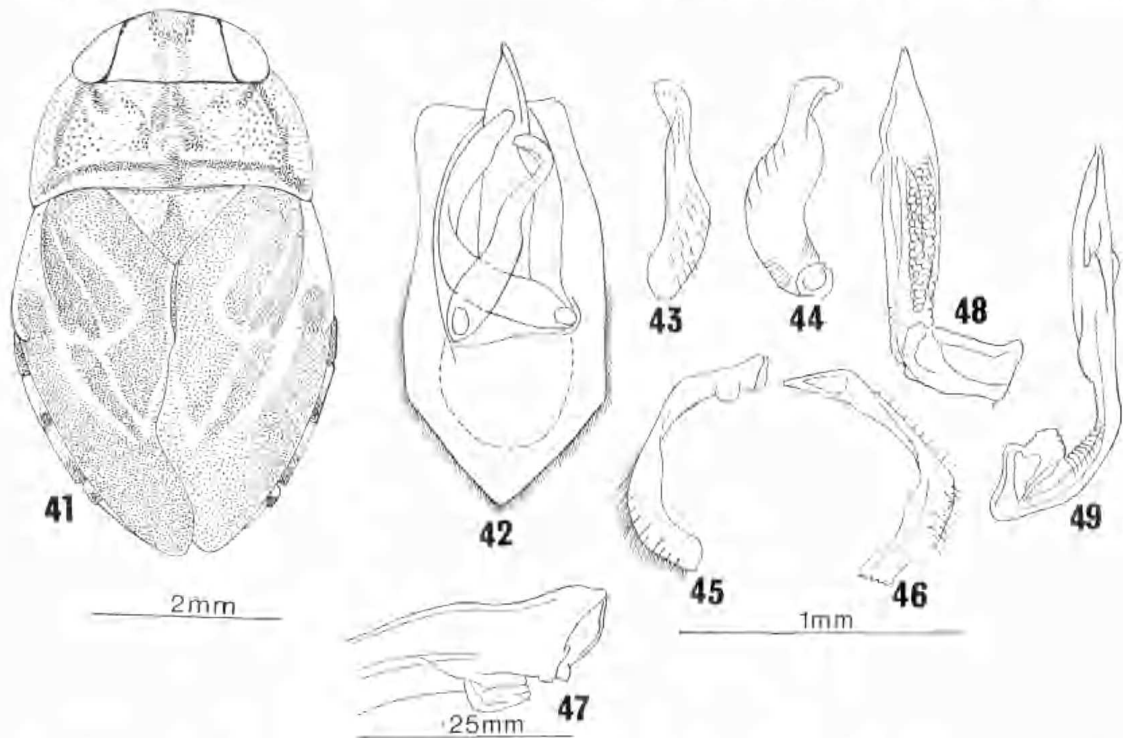
Naucoris subopacus Montandon, 1913, pp. 223-224; Lundblad, 1933, p. 62; La Rivers, 1971, p. 71; Polhemus, 1984, p. 160.

Lectotype: Female and three ♀♀ paralectotypes, Northern Territory, Adelaide River, in the British Museum (Natural History) vid. Two female paralectotypes, same locality SAM, vid.

Distribution: W.A., N.T. and Qld.

Males 6.6-6.9 long, width 4-4.2. Females 6.6-7.6 long, width 4.3-4.6.

Colour: Dark form; head dark yellow with brown punctures, finely rugulose appearing dull, in artificial light rather more shining. Pronotum medianly rugulose; most of anterior 1/3 and middle 1/3 covered with brown punctures; anteriorly divided with pale triangular area; within paler area, group of shallow brown punctures with many longitudinal brown stripes posteriorly. Lateral margins smooth yellowish-brown. Scutellum pitchy, reddish-brown to black with faint reddish-brown area medianly. Clavus and corium reddish-brown; dark specimens from Fogg Dam, N.T. have obsolete yellowish-brown patches. Embolium apically yellow merging into corial colour. Membrane blotchy yellowish-brown, membrane of left hemielytron smokey-brown. Connexiva yellowish-brown, posteriorly lightly infuscated. Mesosternum laterally yellow, otherwise dark brown to black. Meta-sternum dark reddish-brown. Median sternites reddish-brown, ventral latero-tergites suffused with



Figs 41-49. *Naucoris subopacus* sp. nov. Holotype male, Millstream, Qld 41, dorsum; 42, genital capsule; 43-44, left paramere; 45-46, right paramere; 47, apex of Fig. 45; 48-49, aedeagus.

crenate yellow indentations. Legs yellowish-brown.

Pale form: Head and pronotum pale yellowish-grey; brown spots on head not scattered but in groups either side of mid-line. Punctate area of pronotum not so clearly differentiated from background colour; pattern similar but almost obsolete. Scutellum paler. Irregular yellowish markings on clavus and corium obsolete. Connexiva greyish-yellow with faint infuscation along posterior margins. Underside paler; mesosternum almost completely pale yellow, metasternum tinged with reddish-brown along keel. Pigmentation of dorsum decidedly fugitive, fading rather quickly. Dark areas of head and pronotum fade rapidly leaving sculpturing and rugulose areas. Connexiva tend to fade to uniform greyish-yellow and scutellum loses its almost black colouring post-mortem.

Structure: Anterior interocular distance always less than posterior interocular space. Inner margin of eyes converging anteriorly (Fig. 8). Greatest width of head 3-4 × median length; variation in part due to position of head post-mortem; card-mounted specimens have head pushed forward in front of pronotum. Fresh or "wet" specimens tend to have head "dipping" below level of pronotum. Pronotal humeral width between 2.25-2.5 × median length, latter being ca. 2 × median length. Pronotum elevated or "hump-backed", lateral margins diverging, sometimes strongly rugulose with conspicuous irregular sculpturing over most of disc. Scutellum finely punctate; male about 1.7 × broader than long, female 1.6-1.9 ×. Postero-lateral angles of connexiva broadly exposed forming approximate 90° angle. Labrum 1.4-1.7 × broader than long. Mesosternal ridge prominent, clearly produced cephalad. Male fifth sternite slightly asymmetrical. Sternites five and six of male with long hairs; remainder of sternites dark, tomentose. Fifth female median sternite slightly shorter than sixth, seventh not as long as fifth (Fig. 9). Operculum (Fig. 53). Shining area of third ventral latero-tergite narrow (Fig. 38). Male genitalia (Figs 56-61).

Lectotype designation: The type series of *Naucoris subopacus* comprises two species; *N. subopacus* and *N. rhizomatus*. Montandon did not designate any specimen as Type. A female labelled North Australia, Adelaide River, Adelaide River Station, July 14-18th, 1891, J. J. Walker is hereby designated and labelled Lectotype. Three females with identical data are designated paralectotypes. All the foregoing are in the British Museum Natural History. A further female paralectotype in the South Australian Museum has been designated which was originally part of Montandon's syntypic series. A sixth female from North Australia,

Adelaide River, Adelaide River Station, 8-13th August, 1890, J. J. Walker is labelled and designated paralectotype of *N. subopacus* although it is in fact *N. rhizomatus*. All the preceding material was collected during the Voyage of H.M.S. Penguin 1890-1893 and presented to the British Museum by the Lords of the Admiralty, 1896.

Material examined: N.T.: Koolpanyah, G. F. Hill; 30 miles east of Darwin, G.F.H., SAM. McMinis lagoon near Darwin, 4-16.v.1979, I. Lansbury; Fogg Dam near Darwin, 4-16.v.1979, I.L.; billabong near Nourlangie Rock, Kakadu National Park, 10.v.1979, I.L.; Arnhem Highway, Mary River pools, 17.v.1979, I.L. ANIC, Canberra. Jabluka area, Magela Creek floodplain, Buffalo billabong, 22.i.1979 (immature) R. Tait; same data, 20.vii.1979; Jabluka Billabong, 17.iii.1979 (immature); same data, 15.v.1979 (immature); Nankeen Billabong, 13.iii.1979; Wimmera Billabong, 14.iv.1979, R. Tait, ANIC Canberra. Qld: Split Rock, 14 km south of Laura, 23-26.vi.1975, G. B. Monteilh OM, Brisbane. W.A.: Beverley Springs, 1.ix.1969, D. D. Giuliani; WAM, Perth.

Naucoris subopacus is a small robust species; the broadly exposed connexiva and narrow shining third ventral latero-tergite distinguish *N. subopacus* from the rest of the genus within Australia.

Naucoris rhizomatus Polhemus

FIGS 10, 30, 39 & 52

Naucoris subopacus Montandon, 1913, pp. 223-224 (partim.)

Naucoris rhizomatus Polhemus, 1984, pp. 157-158.

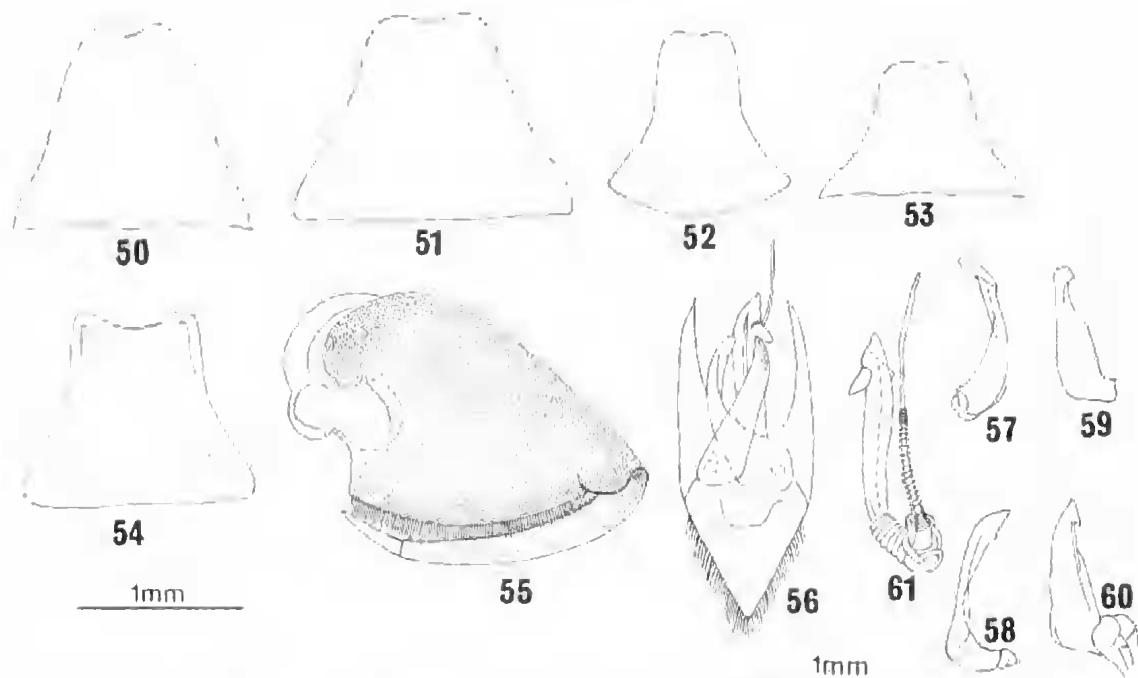
Holotype: Male, N.T., near Darwin, Coomalie Creek, 11.xii.1977, J. T. Polhemus, in the ANIC, Canberra. Paratype male and female originally deposited in Oxford (Polhemus, 1984: 157) is now in ANIC, Canberra.

Superficially this naucorid resembles *N. subopacus*. The latter has narrow shining latero-tergites (Fig. 9); those of *N. rhizomatus* are broad, distally infuscated. The lateral margin of third latero-tergite basally much broader than apex of fourth (Fig. 39); this feature common to both sexes. Scutellum relatively shorter than in *N. subopacus*, always 2 × broader than long; lateral margins more rounded and apex far less acuminate than in *N. subopacus*. Mesosternal ridge more produced cephalad. Male fifth sternite (Fig. 30). Female operculum (Fig. 52).

Material examined: One ♀ paralectotype of *N. subopacus*. N., Australia, Adelaide River, Adelaide River Station, 8-13th August, 1890, J. J. Walker SAM.

N.T.: Jabluka region, Magela floodplain, Buffalo Billabong, 22.i.1979, R. Tait, 1 immature, connexival markings prominent; same data, 20.vii.1979, 1 ♂ taken with ♂ *N. subopacus*.

Polhemus (1984) describes the habitat where *N. rhizomatus* was found in Australia as a deep water creek, the bugs being found amongst the tangled roots of *Pandanus*. *Naucoris subopacus* tends to be found in shallow weedy habitats. The slender



Figs 50-61. Female operculum of 50, *Naucoris congrex* Stål, Holotype; 51, *N. australicus* Stål, Lectotype; 52, *N. rhizomatus* Polhemus Adelaide River, N.T.; 53, *N. subopacus* Montandon, Adelaide River, N.T.; 54, *N. subaureus* sp. nov. paratype, Millstream, Qld. 55, *N. subaureus* sp. nov. fore leg, Holotype male, Millstream, Qld; *N. subopacus* Montandon, male genitalia, 56, 57, 59 & 61 Fogg Dam, N.T.; 58 & 60, 30 miles east of Darwin, N.T. 56, genital capsule; 57, 58, right paramere; 59, 60, left paramere; 61, aedeagus.

evidence suggests that occasionally *N. subopacus* and *N. rhizomatus* occur in the same habitat.

Naucoris subaureus sp. nov.

FIGS 29, 40-49, 54 & 55

Holotype: Male and paratype female, W.A., Millstream, 23.vii.1958, R. P. McMillan in WAM, Perth. Two ♀♀ paratypes (one teneral without dorsal pigmentation), W.A., Drysdale River, 18-21.viii.1975, (14°39'S, 126°57'E), I. F. B. Common & M. S. Upton. One ♀ paratype, W.A., Drysdale River, 3-8.vii.1975, (15°02'S, 126°55'E), I.F.B.C. and M.S.U. ANIC, Canberra.

Distribution: W.A.

Male 7.0 long, width 4.6. Females 7.8 long, width 4.5-4.9.

Colour: Head yellowish-brown, medianly a longitudinal stripe of contiguous brown spots, constricted midway along length. Pronotum medianly shining, lateral margins dull yellowish-brown. From anterior margin two broad brown bands almost reaching posterior 1/3; anteriorly with two secondary groups of brown punctures directed towards middle of disc. Pronotum lightly striated with inverted brown "V" shaped pattern between secondary groups of brown sculpturing; much of disc covered with shallow pits; middle of posterior

margin with short brown bar directed cephalad. Scutellum pale with broad brown band from base to apex. Embolium basally yellowish-brown apically dark brown outlined in pale yellow. Clavus and corium dark brown with confused pattern of yellowish-brown lines. Membrane dark brown with small yellowish nodules. Connexiva anteriorly yellowish, posteriorly dark brown to black. Underside shining pale yellow other than dark brown embolium. Ventral latero-tergites basally dark brown. Legs pale yellow.

Structure: Posterior interocular space greater than anterior width. Inner lateral eye margins more or less straight, converging anteriorly. Greatest width of head $3\times$ median head length and just over half of pronotum. Pronotal humeral width about $2.5\times$ median length, lateral margins slightly convex; humeral angles directed caudad. Scutellum punctate, just under $2\times$ broader than long. Emboliar fracture anteriorly prominent, posteriorly obsolete. Clavus and corium not differentiated; membrane continuous with corium and coriaceous (Fig. 41). Postero-lateral angle of sixth connexiva slightly produced in female; third-sixth postero-lateral angles of male connexiva forming an approximate 90° angle. Labrum about $1.5\times$ broader than long. Mesosternal ridge elevated posteriorly,

crest covered with shining yellow hairs. Mesosternal carina vestigial. Sternites covered in thick shining golden pubescence. Ventral latero-tergites narrow (Fig. 40). Female sixth sternite $2 \times$ longer than fifth and $1.25 \times$ longer than seventh. Operculum (Fig. 54). Seventh parasternite with vestigial depression. Male fifth sternite (Fig. 29). Front leg (Fig. 55). Male genitalia (Figs 42-49), capsule sclerotised, not membranous apically, parameres long.

Naucoris subaureus is easily recognised by the thick golden pubescence covering the median sternites, produced pronotal angles and striking pattern on the clavus and corium.

Comments on distribution and biology of Australian Naucoris

Within Australia there are two species pairs *N. australicus/congrex* and *N. subopacus/rhizomatus*. The fifth species *N. subaureus* is anomalous.

Naucoris australicus/congrex: These are superficially similar in size and general coloration and in having an "easterly" distribution. There are insufficient data to comment any further on *N. australicus*. The most northerly record of *N. congrex* is Mareeba, Atherton Tableland, Qld. Its occurrence so far north may be as a result of a "climatic" anomaly caused by the "high" plateau with a more temperate climate compared with the tropical climate of the surrounding areas. *N. congrex* is common in Tas., and data suggest that at the southern end of the range, it is normally univoltine. Occasionally a partial second generation may overwinter in the immature stages. Data based on samples collected 1972-1973 from Tas.: (small lake, Pawleena; Coal River 4 miles north of Richmond; small lake, upper reaches Sorell River and Blackmans Lagoon) tend to support this hypothesis. Mature adults are present from March-October, but by then numbers appear to be low. Pairing and oviposition presumably take place in August-September; by November, 3rd instar nymphs are present. Immature stages continue to be present until February. Teneral adults start appearing in January or earlier (no data are available for December). By March adults are mature and the immature stages are not usually present. Immatures were collected in May from Blackmans Lagoon possibly representing an overwintering population of immature *N. congrex*.

In Tas. *N. congrex* has a low index species diversity; for example if *N. congrex* is common it outcompetes other waterbugs. Of some 64 habitats sampled *N. congrex* was found in ten, eight of which have five other species of aquatic and semi-aquatic Heteroptera. Greatest diversity was in Blackmans Lagoon (nine species total) which was

sampled quite extensively. On the mainland, *N. congrex* is found most commonly in Vic. This probably is due, in part, to the greater number of freshwater habitats in Vic. compared with S. Aust., and also reflects lack of collecting in N.S.W. In Vic., *N. congrex* was found in nine out of 37 habitats; greatest species diversity was 15, the lowest three; of the latter, *N. congrex* was the commonest species. Immature stages were collected from March-June in Vic. and Qld.

Naucoris subopacus/rhizomatus: These two species are remarkably similar in size, configuration and coloration. Both have a "northerly" distribution extending from N.W. Australia, across the N.T. to Qld near Laura. Most of the habitats sampled by the author in 1979 where *N. subopacus* was found also had *Diplonychus* (Belostomatidae) present. The belostomatid populations were always much greater numerically than those of *N. subopacus*.

Naucoris subaureus: Does not belong to either of the species pairs and is unlike other *Naucoris* species from SE Asia. The Millstream Oasis south of the Great Sandy Desert is noted for its distinctive fauna, especially Odonata (Watson 1981). Data on water-bugs are scanty. The occurrence of *N. subaureus* in the Drysdale River area of NW Australia suggests that the Sandy Desert does not impede the dispersal of water-bugs between the Millstream Oasis and the Kimberley.

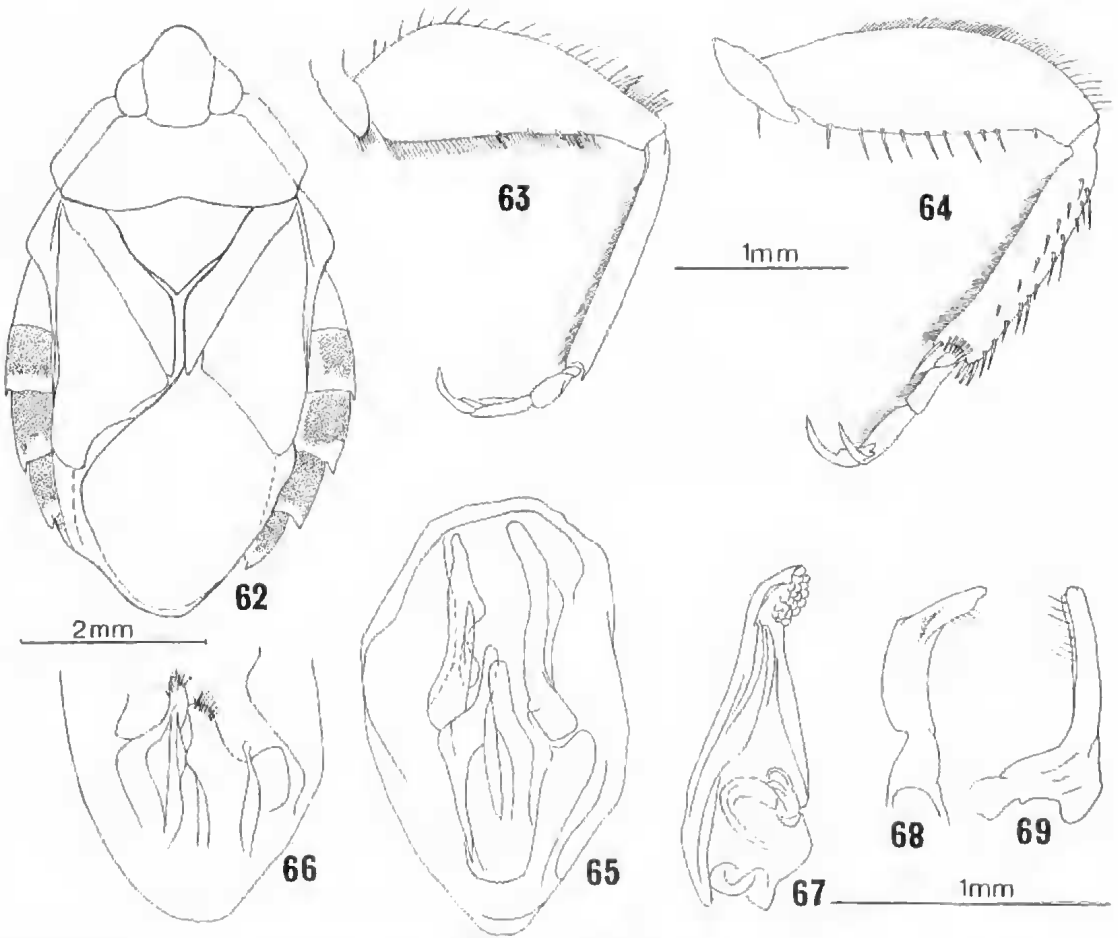
Aphelocheirus australicus Usinger

FIGS 62-69

Aphelocheirus australicus Usinger, 1937, pp. 341-342.
Aphelocheirus: Woodward *et al.*, 1970, p. 456 (mentioned only).

Useful diagnostic features are: Head, pronotum, scutellum and most of clavus more or less shining, Corium and embolium dull. Underside appearing smooth and shining.

Body dorso-ventrally compressed. Head longer than broad, antennae long, four-segmented, usually visible from above. Rostrum reaching mid-coxae. Pronotum transverse, lateral margins explanate; median length clearly shorter than median head length; posterior margin roundly emarginate in front of scutellum. Embolium basally broad, tapering apically along margin of corium. Membrane distinct from corium. Connexivum broadly exposed. (Usinger's figure shows first visible connexival segment infuscated.) Specimens from N. Qld have this segment pale yellow, not broadly infuscated, as are remainder (Fig. 62). Femora of all legs dorso-ventrally flattened (Figs 63, 64). Fore and mid legs alike. Male genitalia (Figs 65-69); within capsule, pair of processes attached to lateral plates; distally processes heavily sclerotised with dark brown spines apically (Fig. 66). These



Figs 62-69. *Aphelocheirus australicus* Usinger, male, Cape York, Lockerbie, Qld. 62, dorsum; 63, fore leg; 64, mid leg; 65, genital capsule; 66, detail of spinose processes on lateral plates; 67, aedeagus; 68, 69, left and right parameres.

structures not found in *Naucoris*. Aedeagus more robust (Fig. 67). Parameres elongate, symmetrical with long spines distally (Figs 68, 69).

Hoberlandt & Štys (1979) comment on the "apparent" venation of the membrane of some Apehlocheirines. The female from "Captain Billy Creek" appears to have vestigial venation. By examination under a strong light, it is possible to detect slight folds in the texture of the membrane, the folds forming two irregular cells with unconnected brachial pattern. A male from Lockerbie does not have a cellular pattern but more a confused anastomosing system. Originally described from Cairns, Qld the holotype female is said to be in the California Academy of Sciences.

Material examined: (all macropterous), Qld, 142°45'E, 11°40'S, Dividing Range, 15 km west of Captain Billy Creek, Cape York Peninsula, 5-12.ii.1976, G. B. Monteith; Upper Qld, Lockerbie area, Cape York, 13-27.iv.1973, G.B.M. QM, Brisbane.

Aphelocheirus is normally thought to be restricted to well-oxygenated water; the bugs are found crawling about beneath rocks and stones. Typical *Aphelocheirus* habitats are the Boulders at Babinda near Cairns where the creek flows very rapidly over and under granitic boulders. The habitats in Cape York are described by Monteith as swampy with sluggish streams. All Cape York material was collected at light (T. E. Woodward *in litt.* 4.iii.1977). Hoberlandt & Štys (1979) commented on flight in the Apehlocheirinae and all the known material of their new taxa were taken at light.

In the Palaearctic region the presence of *Aphelocheirus* is taken as a reliable indicator of water purity. The species *A. aestivalis* has an efficient plastron allowing gas exchange to take place without the bug having to surface, in contrast to *Naucoris*. The Cairns habitat tends to suggest

that Australian *Aphelocheirus* has a similar plastron respiration system. However, the presence of the species in Cape York occurring in swamp sluggish creeks need not be considered unusual as Thorpe & Crisp (1947) list a wide variety of habitats where *Aphelocheirus aestivalis* (F.) has been found in Europe. Within the Palaearctic region, *Aphelocheirus* is dimorphic but it is not known if it is so in Australia.

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